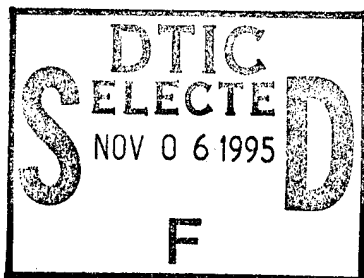


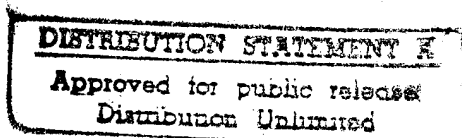
DOCUMENTED BRIEFING



RAND

*The Civilian Airline
Industry's Role in
Military Pilot Retention
Beggarmen or Thief?*

Claire Mitchell Levy



National Defense Research Institute

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DOCUMENTED BRIEFING

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The Civilian Airline Industry's Role in Military Pilot Retention Beggarman or Thief?

Claire Mitchell Levy

*Prepared for the
Office of the Secretary of Defense*

National Defense Research Institute

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PREFACE

The research presented in this documented briefing is part of an overall effort that provides a critical assessment of future pilot requirements, management, and training.¹ As part of that effort, RAND was asked to look at the interaction between civilian airlines and military pilots.² Specific concerns were raised over the effect that airlines might have in the future on the retention of a significantly reduced cohort of military pilots. This briefing investigates the nature of that interaction, and what problems could arise in the future.

The results from this research were briefed to members of the Office of the Secretary of Defense in March 1994.

This research was sponsored by the Undersecretary of Defense for Personnel and Readiness and the Assistant Secretary of Defense for Reserve Affairs and undertaken within the Defense Manpower Research Center, which is part of RAND's National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, and the defense agencies.

¹The broader research effort is documented in *A Critical Assessment of Pilot Requirements, Management, Training*, Harry J. Thie, William W. Taylor, Claire Mitchell Levy, Clifford M. Graf II, and Sheila Nataraj Kirby, DB-121/OSD, 1994.

²The research in this document focuses on those airlines that hire the bulk of military separations, the *major* airlines. The U.S. Department of Transportation defines these as airlines with more than \$1 billion in annual revenue. See the appendix for more information on the structure of the U.S. airline industry.

SUMMARY

The services are undergoing a fundamental reshaping and restructuring, driven by the demands of a new era of tighter fiscal constraints, new security challenges, and new technology. To reduce strength, the services are constraining accessions, encouraging voluntary departures, and imposing involuntary separations. This has raised concerns regarding total personnel readiness in the near future as the flow of active personnel to the reserve components is sharply reduced.

RAND was asked to undertake a critical assessment of pilot management and training from a total force perspective, with special emphasis on three areas: (1) the requirements for pilots in the context of the defense drawdown and restructuring; (2) the supply of pilots in the same context and the sustainability of such a force—given historical trends in accession, retention, and transfers to the reserves; and (3) the effectiveness of current personnel management and training policies in meeting future needs. As part of that assessment, we were asked to undertake an analysis of the interactions between civilian airlines and the retention of military pilots and the eventual sustainability of the required military pilot force. This documented briefing reports the results of that analysis.

The military has historically been concerned that the airlines have had a *detrimental* effect on retention, and this has been often cited as the central problem in management of military pilots. In fact, this is not always the case. Historical data show time periods where there is an inverse relationship between civilian airline hiring and military pilot retention (that is, when civilian airline hiring goes up, military pilot retention goes down), and other times when retention and hiring move in the same direction. Clearly, other factors, such as military career opportunity, time separated from families, and overall morale can and do have significant impact on the retention of military pilots. Time and effort should be given to examining the effects of these other factors on the retention of military pilots.

To explore the relationship between civilian airline hiring and military pilot retention, this study addressed three basic questions:

1. What is the number of pilots likely to be needed by civilian airlines, both in terms of overall requirements and the requirement for new pilot hires?
2. What is likely to be the number of military pilots available for civilian airline hiring?
3. Will there be any future problems regarding the flows of military pilots to civilian airlines and to the reserve components? The answers to 1 and 2 above provide a first look at whether there are likely to be any problems. Given a problem, should the military attempt to adopt policies designed to address such potential problems? If so, what management tools does the military have to manage the pilot flow?

It is important at the outset to understand the focus of this study and its limitations. The study is not a fully articulated demand-and-supply analysis of the labor market for military or civilian pilots. Budget and time limitations precluded such a study. Instead, what is presented is a fairly circumscribed examination of civilian airline hiring of military pilots, both historical and projected, and some thoughts on the adequacy of future flows of military pilots to the civilian sector. Clearly, the conclusions of the study rest crucially on the assumptions underlying the analysis and, in particular, the projections of future civilian airline hiring. Nonetheless, this study performs a useful function by highlighting the interaction between civilian airline pilot requirements and flows of military pilots and emphasizing the importance of adopting a national perspective when managing the pilot force.

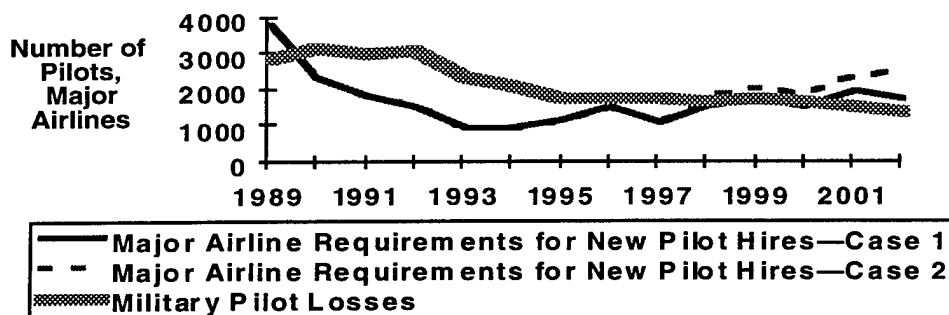
IS THERE A PROBLEM IN THE FUTURE?

Traditionally, military planners are concerned with whether civilian airline demand for military pilots will exceed the supply available and influence these highly trained and valuable pilots to separate from the military. Problems may also arise for the military, however, if too many pilots *remain* in the military. Retention that is higher than requirements can cause difficulties in the accession of new pilots (absorption), the promotion of younger cohorts, and the assignment system in general.

Our analysis shows that in the near term, there appears to be a large enough flow out of the military to provide a sufficient number of pilots to major U.S. airlines (see the figure). This is due to two factors. First, major U.S. airlines will have relatively modest requirements for new pilot hires through 1997 as they continue to recover from the worldwide recession of the early 1990s. Second, during this time period there is a relatively large reserve pool of military pilots who are separating or being forced to separate because of the post-cold war military drawdown. Indeed, the reserve pool is larger than civilian airline requirements; if queueing for civilian jobs becomes widespread, then voluntary separations from the military might be driven down, and the services might well find themselves in the unenviable position of being forced to initiate losses to meet their downsizing goals.

In the midterm, which we define as the period from 1997 through the year 2002, we feel that there will *likely* be sufficient military losses to meet new hiring requirements of the major airlines.

The longer term begins in 2002 when the first Air Force undergraduate pilot training (UPT) class of significantly reduced levels (500 UPT class of 1994) reaches the 10 YOS point where they could separate from the military and elect to fly for the airlines. In this case, given airline hiring requirements, and the precipitous drop in military losses due to the services' decreased production of new pilots, there is likely to be a problem. Desired hiring of military pilots by the civilian airlines will exceed the amount the military wants to or is able to flow to the airlines.



Figure—Future Flows of Military Pilots to Airlines

Repercussions could be serious. The pool of military pilots from which civilian airlines hire is the same pool from which the Air Reserve Component (ARC) hires (although the ARC also has its own means of training pilots, with some limited number going through UPT). If this pool is becoming drastically reduced, will the flows from the active military be sufficient to man the ARC? If not, then this situation may have serious implications for readiness.

POLICY IMPLICATIONS

While further study of these flows is needed to fully understand this phenomenon, our preliminary findings indicate which policy instruments will be most effective in redressing a future problem. We find that current retention policies can effect change only on the margin. They cannot significantly alter the shape of the force.

Accession policies and policies that subsequently experience pilots, on the other hand, are critical to ensure that the force is properly structured in terms of mission areas and experience. Along these lines, it is likely that current levels of pilot production for the Air Force will need to be increased.

It is important to point out that the analysis presented here is based upon certain assumptions we have made. Should these underlying assumptions change, it could alter the basic conclusions regarding whether there are problems in the future in flowing active military pilots to the reserves.

CIVILIAN AIRLINES:

INTERACTIONS AND IMPLICATIONS

FOR

MILITARY PILOT MANAGEMENT

RAND has been conducting research on military pilot management and training for the Under Secretary of Defense and Readiness (Personnel and Readiness) and the Assistant Secretary of Defense (Reserve Affairs). The overall project is tasked with providing a critical assessment of total force pilot requirements, management, and training issues in the post-cold war era. The study has four specific tasks:

1. Examine near-term requirements for pilots in the Air Force and Navy in the context of the defense drawdown and restructuring
2. Examine availability of pilots in the near term
3. Examine the interaction of civilian airlines and military aviation with respect to pilots
4. Assess current management and personnel policies in terms of their effectiveness in meeting future needs.

This document examines the third task on the interactions of civilian airlines with the military. Specific concerns were raised over the impact of civilian airline hiring on the retention of a significantly reduced cohort of military pilots. This briefing investigates the nature of that interaction and what problems could arise in the future.

It is important to understand at the outset the focus of this study and its limitations. The study is not a fully articulated demand-and-supply analysis of the labor market for military or civilian pilots. Budget and time limitations precluded such a study. Instead, what is presented is a fairly circumscribed examination of civilian airline hiring of military pilots, both historical and projected, and some thoughts on the adequacy of future flows of military pilots to the civilian sector. Clearly, the conclusions of the study rest crucially on the assumptions underlying the analysis and, in particular, the projections of future civilian airline hiring. Nonetheless, this study performs a useful function by highlighting the interaction between civilian airline pilot requirements and flows of military pilots and emphasizing the importance of adopting a national perspective when managing the pilot force.

This report addresses three basic questions:

a. What is the number of pilots likely to be needed by civilian airlines, both in terms of overall requirements and the requirement for new pilot hires?¹ The number of pilots actually hired is clearly the result of the interaction of demand and supply. Demand for pilots is derived from the demand for airline travel, and this is tied to the general health of the U.S. economy.

Economists have had a difficult time forecasting the course of the U.S. economy and this makes it particularly difficult to forecast the shifts in the demand for airline travel, and consequently, shifts in the demand for airline pilots. In addition, demand for pilots is likely to be affected by a number of other factors: equipment purchases and equipment configuration changes, retirements and attrition from inventory, utilization rates of existing aircraft, route structure changes, and specific working conditions set out in labor contracts. Clearly, these

¹The research in this document focuses on those civilian airlines that hire the bulk of military trained pilots, the *major* airlines. The U.S. Department of Transportation defines these as airlines with more than \$1 billion in annual revenue. See the appendix for more information on the structure of the U.S. airline industry.

issues cannot be fully addressed in this report. Instead, it is assumed explicitly that these factors are held constant at the current levels or current rates. Projections of the number of new pilot hires likely to be needed are then made, using the assumptions of the Blue Ribbon Panel study, discussed in detail later.

b. What is likely to be the number of military pilots available for civilian airline hiring? Once again, this is not a full analysis of supply. Assuming that relative civilian-military wages remain constant, the number of military losses (projected based on current separation rates) provides an answer to this question.

c. Will there be any future problems regarding the flows of military pilots to civilian airlines and to the reserve components? The answers to a and b above provide a first look at whether there are likely to be any problems. Given a problem, should the military attempt to adopt policies designed to address such potential problems? If so, what can the military do to manage the pilot flow?

Although the analysis reported here is clearly limited, nonetheless it offers insights into the nature of the close interrelationship of the civilian airline industry and the military, and the need for a national perspective.

The Changing Future Environment— A Total Perspective

Do we need a larger context for smaller future forces?

“Total” perspective emerging as context for pilot training and management

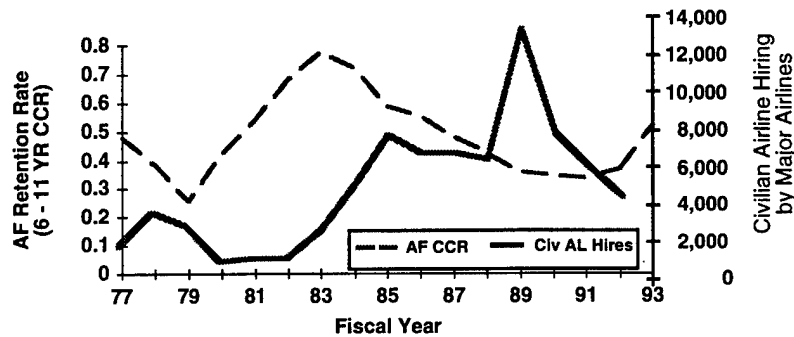
- **Total DoD—e.g., naval aviation with Marine Corps air**
- **Total Force—e.g., active Air Force with Air Reserve Component**
- **Total U.S.—e.g., civil aviation interactions with military aviation**

A critical aspect of our research on pilot management has been the need for a total perspective.

This has always been true but becomes more important in the future as the active component shrinks and as some other components (e.g., the Air Reserve Component—ARC) do not shrink as much. Moreover, the missions of the reserve component, most notably the airlift mission, have an increased role in meeting our national security objectives. Civilian airlines play a role in this airlift mission through charters and the Civilian Reserve Air Fleet (CRAF) program. Additionally, many reserve component pilots also fly for the airlines. These interrelationships suggest that there is an interaction between civilian airline employment patterns and military pilot management and training that should be paid attention to.

Why Should The Military Care About Civilian Airlines?

Civilian airline hiring is often cited as the central problem in management of U.S. military pilots, specifically with respect to retention.



Why should the U.S. military be concerned about civilian airlines? The military has historically been concerned that airline hiring of military pilots has a detrimental effect on retention, and this has been often cited as the central problem in management of military pilots.

Historical data cited in the 1988 DoD Aviator Retention Study indicates, however, that this relationship is not always clear. This chart shows Air Force retention data measured in terms of the 6-11 year cumulative continuation rate (CCR),² plotted against civilian airline hiring, as reported by the Future Aviation Professionals of America (FAPA). The hiring data cited in the graph include national major regional jet airlines, as well as cargo airlines such as Federal Express.

There are some periods where an inverse relationship between civilian airline hiring and military retention is demonstrated. In 1977, airline hiring went up, and retention dropped precipitously. Then as airline hiring was declining in 1979, military retention increased sharply. A decrease in military retention from 1983 through 1985 was matched by an increase in airline hiring.

²The 6-11 year CCR has been a traditional measure of effectiveness for retention of military pilots, albeit a controversial and inadequate one.

However, there are also time periods when airline hiring and military retention move in the *same direction*. During most of the early 1980s when military retention increased dramatically, from an all-time low of 25.7 percent in 1979 to an all-time high of 77.6 percent in 1983, civilian airline hiring was also increasing. Similarly, from 1985 through 1988 both retention and hiring were decreasing.

It is clear that other forces beyond airline hiring contributed to these ebbs and flows in military pilot retention. These forces include cohort size, morale, and significant military compensation increases. These need to be examined, and it needs to be understood that civilian airline hiring is only one of the factors. An overstatement of the relationship between civilian airline hiring and military retention could complicate the difficult task of military pilot management.

Similarly, it is important to keep in mind that military pilots are not the only hiring source for the airlines. The airlines have always had a large pool of FAA-qualified pilots from which they could select new hires. With the growth of the regional airlines over the past decade and the continued growth that is anticipated, civilian trained pilots are gaining experience that will make them more attractive to major airlines in the future. The military-civilian experience gap is narrowing, which could also lessen the impact of civilian airline hiring on the military.

Why Should The Military Care About Civilian Airlines?

The Upside—Civilian Airline Links to ARC Pilots, CRAF Airlifters

Civilian airline hiring of U.S. military pilots enables pilots to serve in the Air Reserve Component

- A majority of ARC and USNR pilots fly for airlines

During the Gulf War, commercial aircraft flew over 5,315 missions, delivered 690,150 troops and 228,400 tons of materiel in support of military requirements (1992 U.S. Industrial Outlook)

- A key component of this was the Civilian Reserve Air Fleet (CRAF) program, which provides supply of civilian airlift pilots and aircraft in time of crisis or war
- About 67 percent of passengers and 15 percent of cargo carried by aircraft to Saudi Arabia was by CRAF aircraft

While the airlines benefit from hiring well-trained, prior-service pilots, the military benefits from the civilian airlines in two ways, which are often overlooked.

First, civilian airline hiring of prior-service pilots enables pilots to serve in the ARC. The bulk of ARC pilots need a primary income for part-time reserve flying to be economically viable. Airline careers have traditionally provided this income. Few other careers provide necessary compensation along with few and flexible hours.

Second, civilian airlines can and have provided pilots, equipment, and associated support during a time of conflict. In the Persian Gulf conflict, the airlines provided valuable assistance to the war effort. By July 15, 1991, commercial aircraft had flown over 5,315 missions and delivered 690,150 troops and 228,400 tons of materiel in support of military requirements.³ A component of this support was the CRAF program, activated for the first time in its 40-year existence.

³1992 U.S. Industrial Outlook, U.S. Department of Commerce.

Both of these factors are becoming even more important in the post-cold war era, as demand for U.S. military support in certain areas elevates the need for ARC and civilian airline support. Future U.S. military requirements in support of our national security objectives call for an increased airlift capability. The ARC and civilian airlines augment our military forces with some of this capability.

Concerns for the U.S. Military to Address

What will civilian airline requirements for military pilots be in the future?

Will military pilot losses be sufficient to meet the needs of civilian airlines and the ARC in the future?

What policies can be used to mitigate any future problems?

This report addresses three basic questions:

1. What is the number of pilots likely to be needed by civilian airlines,⁴ both in terms of overall requirements and the requirement for new pilot hires? The number of pilots actually hired is clearly the result of the interaction of demand and supply. Demand for pilots is derived from the demand for airline travel and this is tied to the general health of the U.S. economy, as described earlier in this document.
2. What is likely to be the number of military pilots available for civilian airline hiring? Once again, this is not a full analysis of supply. Assuming that relative civilian-military wages remain constant, the number of military losses (projected based on current separation rates) provides an answer to this question.
3. Will there be any future problems regarding the flows of military pilots to civilian airlines and to the reserve components? The answers to 1 and 2 above provide a first look at whether there are likely to be any problems. Given a problem, should the military attempt to adopt policies designed to address such potential problems? If so, what can the military do to manage the pilot flow?

⁴Once again, the emphasis of this research is on *major* airlines, which hire the bulk of military trained pilots. See the appendix for more information on the structure of the U.S. airline industry.

Although the analysis reported here is clearly limited, nonetheless it offers insights into the nature of the close interrelationship of the civilian airline industry and the military, and the need for a national perspective.

Blue Ribbon Panel

Established in 1992 by FAA in response to congressional concerns raised over the apparent shortage of well-qualified pilots in the United States.

Objective of the panel: "The panel will examine the existing and future supply of pilots and aviation maintenance technicians for civil and military aviation and will make recommendations for alleviating potential shortages."

The panel completed its work in 1993, issuing its report, "Pilots and Aviation Maintenance Technicians for the Twenty-First Century: An Assessment of Availability and Quality" in August 1993.

The "Blue Ribbon Panel" was established in 1992 by the U.S. Department of Transportation's Federal Aviation Administration (by the Federal Advisory Committee Act) in response to congressional concerns over the apparent shortage of well-qualified pilots in the United States. These congressional concerns were first voiced in 1989. The objective of the panel was stated as the following:

"The panel will examine the existing and future supply of pilots and aviation maintenance technicians for civil and military aviation and will make recommendations for alleviating potential shortages."

Many changes had occurred between the time Congress originally expressed its concerns and the time when the panel was convened. Due to the end of the cold war and associated military drawdown, and the worldwide recession, the situation had reversed itself from a shortage of pilots to one where inventory appeared to exceed requirements.

Blue Ribbon Panel Findings

No current numerical “shortage” of pilots for civilian airline industry, although “shortage of fully qualified pilots” could occur in the latter half of the 1990s.

Current defense changes will reduce availability of military pilots:

- Downsizing of the military
- Current reserve pool of military pilots will begin to dry up
- Military is sending fewer candidates through flight school
- Increased pilot service obligation.

Civilian trained pilots will need to fill the void left by the military drawdown.

Experience gap between civilian and military trained pilots.

The work of the Blue Ribbon Panel was completed in 1993, with a report issued in August 1993.⁵ The main conclusions of the panel were as follows.

First, it found that the original problem it set out to solve— a current shortage in pilots—did not currently exist.

Second, concerns for the future remain, and the panel concluded that a “shortage of *fully qualified* pilots” *could* occur in the latter half of the 1990s, given the cyclical nature of the industry. A driver in this is the decrease in availability of military pilots. Military trained pilots have traditionally been the principal source of hiring for major U.S. airlines. In the post-cold war era, the military will be producing fewer pilots and keeping them longer, reducing the numbers that will be flowing to the airlines.

Third, the panel found, however, that there are sufficient numbers of *civilian trained* pilots to satisfy future civilian airline hiring requirements.

⁵*Pilots and Aviation Maintenance Technicians for the Twenty-First Century: An Assessment of Availability and Quality*, Pilot and Aviation Maintenance Technician Blue Ribbon Panel, U. S. Department of Transportation Federal Aviation Administration, August 1993.

Fourth, there are serious concerns with civilian pilots related to training and experience: (a) there is an *experience gap* between military and civilian trained pilots. The typical military pilot simply has more experience than the average civilian trained pilot; (b) there is the issue of *training standards*. The military has a well-developed, highly demanding, and standardized training program for its new pilots. In hiring these military trained pilots, the airlines know what training they have received. Civilian training of pilots is not standardized and varies widely. Both of these training issues will need to be dealt with in the future to ensure an adequately qualified supply of pilots for civilian airlines.

These conclusions were based largely on the expert opinions of the panel members.

Outline

→ **What will civilian airline requirements for military pilots be in the future?**

Will military pilot losses be sufficient to meet the needs of civilian airlines and the ARC in the future?

What policies can be used to mitigate any future problems?

The first question we have to answer is what civilian airline requirements for military pilots will be in the future.

What Drives Civilian Airline Pilot Hiring Requirements?

A variety of factors, including:

- **Equipment**
 - Equipment Purchases
 - Configuration Changes
 - Equipment Retirements
- **Personnel**
 - Retirements
 - Other Attrition
- **Market Factors**
 - Utilization Rates
 - Route Structure Changes
 - Labor Contracts

A wide variety of factors affects civilian airline pilot hiring requirements, and any combination of these factors could result in changes.

A 1989 Study by the Military Airlift Committee of the National Defense Transportation Association (NDTA) provided one framework for understanding these factors and how they influence civilian airline hiring of pilots.⁶ That three-tiered framework is presented here.

Equipment changes, which include both net changes in the number of aircraft, as well as configuration changes to those aircraft, will tend to shift requirements. For example, if there is a net increase in the number of aircraft in the fleet, more pilots will be required to fly those new aircraft. Configuration changes, on the other hand, include such things as the current change from three-person to two-person crews that certain new aircraft allow for.

⁶A *Perspective on Worldwide Commercial Pilot Supply and Demand, 1989–2000*, Military Airlift Committee of the National Defense Transportation Association (NDTA), 1989.

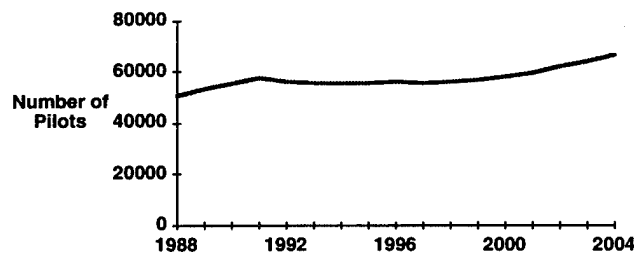
Personnel changes are principally driven by retirements, although other attrition does occur.

Market factors have been a principal driver in recent years, fueled by the worldwide recession and stiff competition in the airline industry. One recent trend in utilization rates has been the attempt by some of the major airlines to follow the example of discount airlines by increasing the number of daily departures per aircraft.⁷ This could potentially affect requirements.

The interrelationship among these factors is quite complex. In addition, during the past several years, virtually all these factors have been in flux, making their effects on requirements for pilots and new pilot hires difficult to predict.

⁷It has been reported that USAir has increased daily departures from 6.9 to 8.4 daily by using a quick-turn schedule. For 22 planes on this schedule, 3,600 seats were added to the market. USAir gets more flying time (and less ground time) from the same planes and crews. "Southwest and USAir Plan to Expand Service at BWI," *Washington Post*, March 23, 1994, p. F1.

Total Requirements for Civilian Airline Pilots Major Airlines



The effects of the recent worldwide recession will keep requirements relatively flat through the 1990s, with an upturn by the end of the decade.

After unprecedented growth of the airline industry through the 1980s, the industry has experienced difficulties that have resulted in flat growth, projected to continue through the 1990s. Three airlines (Pan Am, Eastern, and Midway) went bankrupt in 1991. Others have suffered record losses.

These difficulties can be traced to several problems. A large part of the airlines' problems has been attributed to the worldwide recession and associated reduction in air travel. Other contributing factors cited in the industry have been the Gulf War, which reduced overall air travel,⁸ and recent regulations that could take dollars away from expansion to meet certain safety standards. Moreover, many foreign carriers are experiencing financial losses because of over- or inefficient capacity, which may force them to reduce workforces.

⁸Some believe that the usage of civilian aircraft during this time *helped* rather than hurt the airlines, providing compensation for capacity that would have otherwise been idle.

As shown in this chart, beyond the year 2000, the data show modest growth in pilot requirements for major airlines. These data were derived by the Pilot and Aviation Maintenance Technician Blue Ribbon Panel⁹ using U.S. gross domestic product (GDP) growth as a basis for projecting growth in the total requirements for major airline pilots.¹⁰ This methodology linking economic health of the aviation industry to the economic health of the overall U.S. economy is widespread and commonly used.

However, it is worth indicating that it is the view of this author that the 2.6 percent growth cited for the major airline fleet is an optimistic upper bound. A variety of factors, described below, could result in major airline growth well below this level.

By some accounts, the major airline industry has reached maturity and can no longer count on rapidly increasing passenger traffic coupled with falling or stable prices.¹¹ Competition is arising from technological developments (faxes, teleconferencing, high-speed trains, etc.) and international carriers. Business travel, which has been the bread and butter of the airline industry, has shrunk from 52 percent of all passengers in 1982 to 40 percent currently.¹²

⁹*Pilots and Aviation Maintenance Technicians for the Twenty-First Century: An Assessment of Availability and Quality*, Pilot and Aviation Maintenance Technician Blue Ribbon Panel, U. S. Department of Transportation Federal Aviation Administration, August 1993.

¹⁰As of the time of this report, GDP was forecast to grow at an average annual rate of 2.6 percent through the year 2004. Based on this, the *FAA Aviation Forecast, Fiscal Years 1993–2004* projected that the overall major air carrier fleet would grow at an average annual rate of 2.6 percent. The Blue Ribbon Panel then derived the total requirements for major airline pilots by multiplying the number of aircraft times the size of the crew times the number of crews per aircraft.

¹¹For a more complete analysis of the airline industry's future, see Howard Banks, "A Sixties Industry in a Nineties Economy" *Forbes*, May 9, 1994.

¹²*Ibid.*

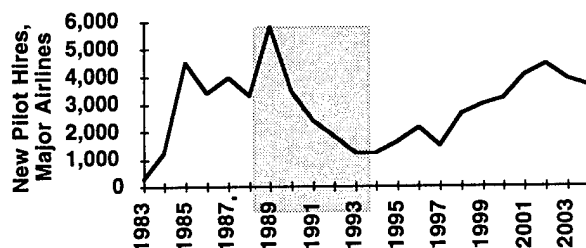
The major airlines themselves have anticipated continuing difficulties with cancellations of aircraft orders through the end of the century. Of the big three airlines, Delta has deferred a total of \$1.3 billion in new aircraft orders, United has announced plans to take 122 fewer planes during the 1992-1995 time period, and American plans for an actual *decrease* in its fleet in 1995, with additional cancelled or deferred orders through the year 2000.¹³

The major airlines, whose costs are highest, are facing the greatest pressures, whereas regional airlines such as Southwest have done quite well. Market shares of major airlines are eroding as regional carriers are able to capture the shorter routes. All of this adds up to a less bright future for the major airlines, which have hired the vast majority of military pilots in the past.

¹³Andrea White, "Apples and Oranges? Comparisons of the Airlines," *Career Pilot*, March 1993.

Requirement for New Pilot Hires Major Airlines

While total requirements for major airline pilots are flat through the end of the century, there will still be new pilot hires.



Through 1997, requirements for new pilot hires will be at relatively low levels (annual average requirement of 1,500 new hires)

Beyond 1998, new pilot hires will increase because of increased retirements and some growth (annual average requirement of over 3,500)

Even though major civilian airlines will be facing flat growth through the 1990s, there will still be new pilot hires. This is because of the need to replace pilots who retire or leave the airlines for other reasons. Beyond the year 2000, an additional factor that will increase the requirement for new pilot hires is the modest growth projected for major airlines.

This graph shows the requirement for new pilot hires by major airlines. Data through 1992 are historical, from FAPA. Future data, from 1993 onward, are from the Blue Ribbon Panel.¹⁴

The bottom line is that pilot hiring requirements for major airlines through the 1990s are relatively flat and at relatively low levels. The average annual rate of new pilot hires by major U.S. airlines from 1992 through the end of the drawdown in 1997 is 1,500—well below historic averages. Hiring patterns of major airlines in the future should more

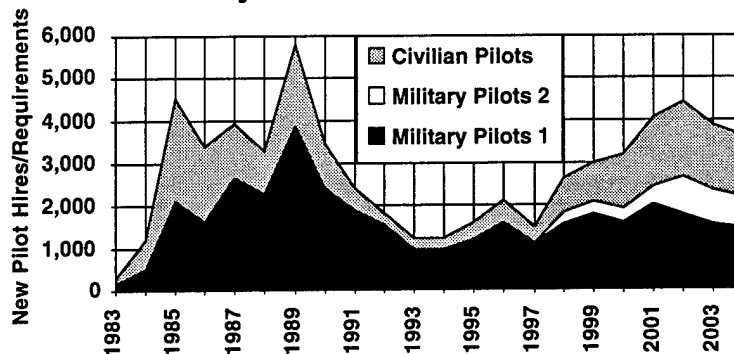
¹⁴The requirement for new pilot hires by major airlines is equal to the growth in pilots over the previous year, plus attrition and retirements, as cited in their report, *Pilots and Aviation Maintenance Technicians for the Twenty-First Century: An Assessment of Availability and Quality*, 1993.

closely resemble the 1990s than the 1980s, with the exception of the early part of the next century, when there will be an increased need for new hires due to the retirement of a large Vietnam era cohort.

Beyond 1998, major airline hiring of pilots picks up and by the year 2000 is expected to be more in line with previous hiring patterns. The annual average from 1998 through 2004 is 3,500. The main driver in the projected increase in hires beginning at the end of the century is retirement of the large Vietnam era cohort. This has been anticipated as a problem for some time. Recent industry restructuring, including the bankruptcy of three airlines in 1991, has helped to mitigate what would have otherwise been a much larger retirement bulge.

Once the Vietnam era cohort is replaced with new hires, industry hiring rates for major airlines should return to levels somewhat above the rate of the 1990s, but well below historic averages.

Major Airline Hiring by Source of Pilots



Through 1997, military share of new pilot jobs could remain high because of availability from post-cold war drawdown. Beyond 1998, military share will likely be lower.

What portion of the new pilot hires will be from the military? This will give us some idea of the demand by the major airlines for military pilots.

In this chart we provide a breakdown of those new hires into their origins—military or civilian. For historical data, we use actual data from FAPA. For future projections, we assume that (1) the airlines will continue to hire larger shares of military pilots throughout the drawdown, because of their availability, and (2) once the drawdown is complete and the pool of available military pilots has begun to dry up, the airlines will turn increasingly to civilian trained pilots for new hires. This latter assumption is consistent with the findings of the Blue Ribbon Panel.

Two alternatives are presented that bound the future hiring of military pilots. In both cases, we assume that major airlines will continue to hire military trained pilots at historically high rates (75 percent) through 1997. A large pool of military separations throughout the post-cold war drawdown period will make this possible. Beyond 1998, the first alternative (Military Pilots 1 in the graph above) assumes that military pilots hired by major civilian airlines will gradually reduce to 40 percent of all new hires by 2004. This is close to the the all-time low

experienced in the 1980s. The second alternative (Military Pilots 2 in the graph) assumes that civilian airline hiring of military pilots will gradually reduce to 60 percent, closer to historic averages. These two cases provide a bounding of what major airline hiring of military pilots is likely to be in the future. Note that a reduced availability of military trained pilots, due to decreased production of military pilots in the post-cold war era, drives these assumptions.

Outline

What will civilian airline requirements for military pilots be in the future?

Will military pilot losses be sufficient to meet the needs of civilian airlines and the ARC in the future?

What policies can be used to mitigate any future problems?

The second question we need to address is that of sources of supply of pilots to major airlines and, in particular, the flows of pilots from the military to the civilian sector.

What Are the Sources of New Civilian Airline Pilots?

U.S. Military

Historically provided 40 percent to 85 percent of new hires for major airlines

Ab Initio Training (colleges and private industry)

These airline-sponsored training programs are the principal source of new hires for many foreign carriers, but not in the U.S.

Grass Roots Training

More and more pilots are earning their own way, gaining experience through flying for the smaller airlines

Foreign Sources

Temporary Sources

Pilots laid off from airlines that went bankrupt in 1991

Pilots furloughed from major airlines

Surplus pool of military pilots from post-cold war drawdown

Where do civilian airline pilots come from? There are a variety of sources, as highlighted on this chart.

The U.S. military is currently the largest supplier of civilian airline pilots, but this has not always been the case, nor will it necessarily need to be the case in the future. At the end of the Vietnam War when the U.S. military had a surplus of pilots, the airlines took advantage of this and hired the bulk of their pilots from the military. When the services increased retention (1983–1986), the airlines went elsewhere for the majority of their hires, and military pilots were not the bulk of new civilian airline hires.¹⁵

International carriers embrace the concept of ab initio pilot training—training nonpilots to become professional pilots. The United States has only used this source in a very limited sense. The irony is that many foreign airlines do their training in the United States. A February 1992 *Professional Pilot* article notes that Lufthansa trains in Phoenix, Arizona, and Japan Airlines trains in California. France and Britain have their own ab initio training programs. The United States has the capability to provide such training, but U.S. airlines choose not to. The reason for this is that the airlines can get the pilots they need from other, less expensive, sources, principally the U.S. military services.

¹⁵DoD *Aviator Retention Study*, Department of Defense, November 28, 1988.

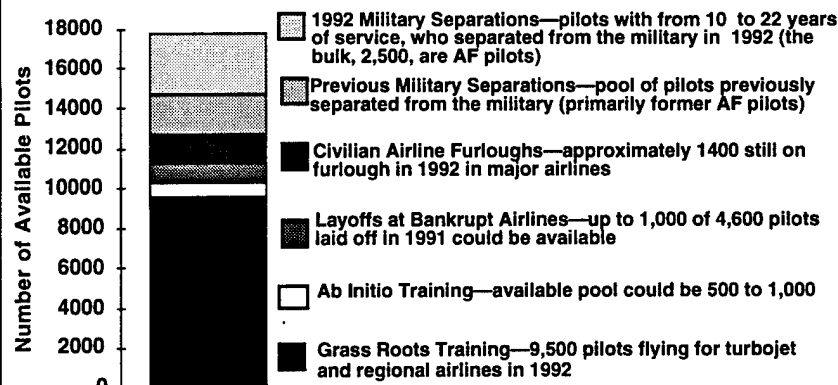
Grass roots training is where young pilots gain experience by serving as instructors or by flying charters or light cargo aircraft. An FAA forecast cited by the May 11, 1989, study predicted that 300 to 800 pilots would be provided this way in future years.

Foreign sources include foreign military pilots and foreign grass roots trained pilots. In addition, as more U.S. airlines partner with foreign carriers, there could be crossover between airlines. Recent indications are that there could be increased flow of foreign pilots to U.S. airlines as certain major foreign carriers are faced with reduced government subsidies and are forced to reduce in size. Deregulation and privatization of several European airlines are scheduled to take place over the next decade.

In the near term there are important temporary reserve pools from which pilots could be hired by civilian airlines. First, there are the pilots laid off by the three airlines, Eastern, Pan Am, and Midway, which went bankrupt in 1991. An April 1993 *Career Pilot* article¹⁶ estimates that 4,300 pilots employed by these airlines lost their jobs. While some were acquired or hired by other major airlines, many are "underemployed" at regional airlines, and many were unable to find jobs at all. Both the underemployed and unemployed could still be eligible for hiring by airlines in the next few years. A second temporary source of pilots for civilian airlines is the pilots currently furloughed by major airlines who still hope to be hired back. Third, there is a pool of separated military pilots who have not yet been able to find jobs with airlines, but who still would like to.

¹⁶Marie Powers, "Scattered: Where did Unemployed Airline Pilots Land?" *Career Pilot*, April 1993.

Reserve Pool of Pilots for Civilian Airline Hiring 1992 Estimate



In 1992, Major airlines hired 1,836 new pilots. Total new hires for all airlines were 4,309

We have just described the different supply sources of airline pilots. This chart provides some sense of the magnitude of each of those sources. This chart disaggregates the 1992 available reserve pool of qualified pilots by source of entry.

The bottom line is that there are lots of pilots, all of whom meet minimum FAA requirements. In 1992, major U.S. airlines hired 1,836 new pilots, with total new hires for all airlines at 4,309. Total available FAA qualified pilots in 1992 shown in this graph numbered over 17,000.

It is clear that some pilots are preferred over others. Traditionally, military pilots are the most valued, because of their rigorous training program and high levels of experience.

For the short term, however, there are three categories of pilots—layoffs, furloughs, and previous military separations—that also have pilots with training and experience levels comparable to those of traditional military hires. These pools will dry up in several years as these pilots find other jobs or retire.

For the longer term, the recent resurgence of regional airlines could be an increasingly important source of pilots for major airlines. The growth of this class of airlines is resulting in a growth in the number of regional airline pilots. Traditionally, a large portion of these pilots would be interested in "moving up" to the major airlines where salaries and benefits are far better. If the Blue Ribbon Panel recommendation that civilian training and experience be more standardized could be applied to this pool of pilots, this could become a more important hiring source for major airlines.

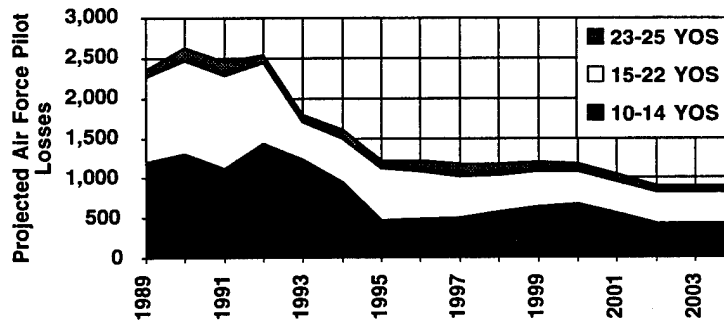
Flow of Military Pilots to Civilian Airlines from the U.S. Air Force

Air Force is largest supplier of military pilots to airlines

Large supply of pilots available through the drawdown years

• includes a growing pool of pilots from previous years

Decreasing supply toward the end of the century



We now turn to the flow of military pilots to civilian airlines. In 1992, an unprecedented 85 percent of new hires for major airlines had military background. Of these, 78 percent had AF experience; 14 percent had Navy experience; 6 percent were from the Marines, and the Army and Coast Guard supplied about 2 percent. In 1991 the AF and Navy shares of military hires by the airlines were 71 percent and 23 percent, respectively.¹⁷

The graph in this chart portrays losses from the U.S. Air Force, which has traditionally been the largest military supplier of pilots to civilian airlines.¹⁸ Exit surveys for the Air Force and Navy indicate that for those officers separating from the service, airline hiring is the number one factor in the decision of Air Force pilots but not of separating Navy

¹⁷From FAPA's 1992 New Hire Pilot Qualifications Survey, as cited in the 1993-1994 *Pilot Directory of Employers*, 1993.

¹⁸Data through the end of the post-cold war military drawdown (1997) are from the United States Air Force. Beyond 1997, U.S. Air Force losses are from a RAND inventory projection model.

pilots.¹⁹ Given these considerations, our detailed analysis is only for the Air Force. When we present a projection of the available pool of military trained pilots later in this document, we will base Navy and U.S. Marine Corps estimates on historic levels.

The data on U.S. Air Force losses presented here are divided into three different strata, differentiated by the pilots' years of service (YOS) in the military. The first group (10 to 14 YOS) consists of pilots who have completed their Active Duty Service Obligation (ADSO) within the past four years.²⁰ These pilots have the most flying years left in their careers, are highly sought after by the airlines, and represent the bulk of airline hires. The second group (15 to 22 YOS) consists of pilots who could still have a 20-year airline career until mandatory retirement at age 60. The final group of pilots (23 to 25 YOS) is the least likely to be hired by an airline.

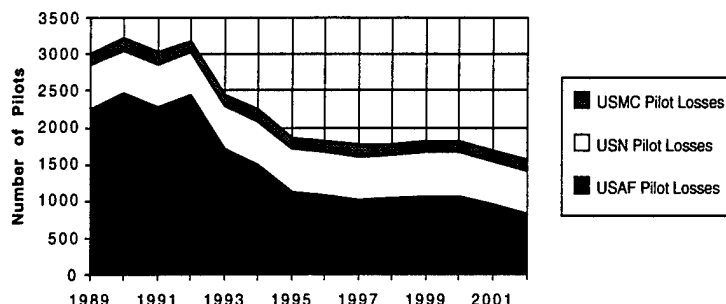
In the two largest and most important categories (through 22 YOS), Air Force separations (losses) in the future will be half what they had been in the late 1980s and early 1990s. The two reasons for this are that (a) production of pilots in the post-cold war era will be significantly lower and (b) U.S. Air Force losses in the late 1980s and early 1990s were at unusually high levels to downsize the force.

This decrease in losses represents a dramatic drop in the supply of Air Force pilots to the airlines, although it is important to note that the supply pool includes pilots from previous years not yet hired by airlines, who are not represented in this graph. While most military pilots are hired by airlines within one year of separation from the service, up to 20 percent join airlines one to four years after separation.

¹⁹Navy pilots cite family separation as their main motivation for separation. It should also be caveated that exit surveys are only partial indicators of how airline hiring affects retention of military pilots. They do not provide insights on how airline hiring affects those pilots who opt to remain in the military.

²⁰The first two strata are linked to the end of the ADSO and vary accordingly. The ADSO is the time a pilot is obligated to serve on active duty following aviation training. The ADSO has been gradually extended from five years in the 1970s for both the Air Force and Navy, to eight years currently for most weapons systems.

Military Pilot Losses All Services



On the previous chart we developed future projections of Air Force losses that could flow to the civilian airlines. As we have mentioned previously, USAF pilots are typically the bulk of military pilots hired by major U.S. airlines.

This graph provides an estimate of the military pilot hires by major airlines for the three services—U.S. Air Force, U.S. Navy, and U.S. Marine Corps. Since the U.S. Army trains only helicopter pilots, and airline hiring data indicates that these pilots are not hired by major U.S. airlines, no Army trained pilots are included.

Data for the U.S. Air Force are from the previous chart. Data for the Navy and U.S. Marine Corps are based on historic data.²¹

²¹Recent discussions with the U.S. Navy indicate no recent changes in the flows of Navy pilots to airlines.

Outline

What will civilian airline requirements for military pilots be in the future?

Will military pilot losses be sufficient to meet the needs of civilian airlines and the ARC in the future?

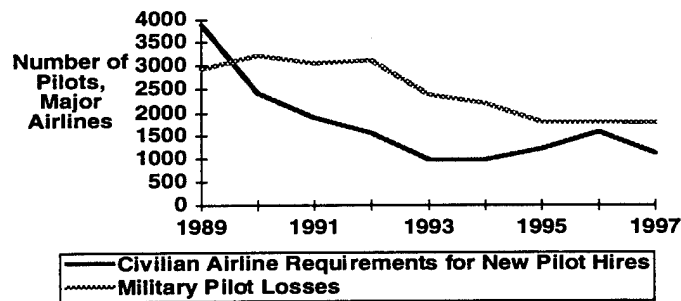
What policies can be used to mitigate any future problems?

This next section brings together the two sides of the picture: projected civilian airline requirements and projected losses from the active force. As previously mentioned, these losses are for all active components.²²

While any prognosis of a shortage or surplus of military pilots needs to be based on a classic demand-and-supply analysis, it is useful to examine requirements against the projected availability of military pilots in the future. If we assume that the underlying supply and demand relationships do not change over time, and that relative civilian-military wage remains constant in real terms, then comparing requirements to flows of military pilots can provide some useful insights into whether, at an aggregate level, there will be sufficient numbers of pilots available for hire by the civilian airlines. Clearly, the actual number hired will depend on the interaction of the specific demand and supply curves, the position of which will be determined by a number of factors, some of which were mentioned earlier.

²²In the previous section, we analyzed projected Air Force losses in detail. Future Navy and Marine Corps pilot losses are based on historic levels.

Is There a Problem? Near-term Prognosis



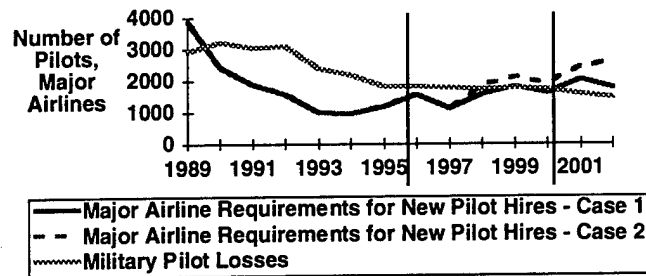
No problem in the near term—there are plenty of military pilots to flow to major U.S. airlines through 1997

- depressed airline hiring through 1997
- reserve pool of military pilots due to post-cold war drawdown

The graph above plots required number of new hires by major U.S. airlines and active force (USAF, USN, USMC) pilot losses from 1989 through 1997.

We can see that in the near term, our prognosis is that there appears to be a large enough flow out of the military to provide sufficient number of pilots to major U.S. airlines. This is due to two factors. First, major U.S. airlines will have relatively modest requirements for new pilot hires through 1997 as they continue to recover from the worldwide recession of the early 1990s. Second, during this time period there is a relatively large reserve pool of military pilots who are separating or being forced to separate because of the post-cold war military drawdown. Indeed, the reserve pool is larger than civilian airline requirements; if queueing for civilian jobs becomes widespread, then voluntary separations from the military might be driven down, and the services might well find themselves in the unenviable position of being forced to initiate losses to meet their downsizing goals.

Is There a Problem? Midterm Prognosis



Beyond 1997 there could be a problem—this will depend on civilian airline hiring criteria and their use of other sources of pilots

- airline hiring picks up because of Vietnam era retirements, modest growth as airline industry recovers
- flow of military pilots to airlines rachets down, and pool of pent-up supply of pilots “expires”

Let us now turn to the midterm, which we define as the period from 1997 through the year 2002. The conclusions here are somewhat more speculative for the obvious reason that the projections are subject to a greater degree of uncertainty than was the case in the near term.

We compare the projected flow of military pilots and requirements, based on two possible scenarios regarding the requirements of major U.S. airlines for new pilot hires. As we explained earlier, we feel that these two scenarios bound the realm of possibilities and offer insights into problems that might occur in terms of the sufficiency of flowing military pilots to major U.S. civilian airlines.

Looking first at military losses, there is a decline over time due to the declines in cohort size (because of the sharply reduced accessions) of the military pilot forces. This is attributable to the post-cold war drawdown.

Regarding the two scenarios for airline hiring requirements, the high requirements curve is based on the assumption that military pilots will account for 60 percent of new pilot requirements (close to historic averages), while the low requirements curve is based on the assumption that the proportion will be 40 percent.²³ These assumptions are more fully explained earlier in this document.

It is clear from just examining the numbers that the military losses will be large enough to meet the low requirements projections. They will *likely* be large enough to meet the high requirements projections, although in this latter case there may be a slight problem.

²³These two alternatives are the same two curves presented earlier.

Is There a Problem? Longer-Term Prognosis

Forecasting numeric estimates for future civilian airline requirements and military losses is precarious.

- **Requirements**—Civilian airline demand will likely increase somewhat, with moderate airline growth beyond the year 2002
- **Military Pilot Losses**—Supply of military pilots will drop precipitously as the current UPT classes of 500 active AF officers reach 10 YOS, the first point when they are eligible to separate and join the airlines

Implications are serious:

- Imbalance between requirements and losses may affect retention of military pilots
- More importantly, from the military perspective, imbalance implies insufficient flow to the ARC.

The longer term begins in 2002 when the first Air Force undergraduate pilot training (UPT) class of significantly reduced levels (500 UPT class of 1994) reaches the 10 YOS point when they can separate from the military and elect to fly for the airlines.²⁴ We do not graphically represent this future case—trying to do so would be deceptive in portraying the data as more concrete than they are.

In the longer term, we know that given airline hiring requirements, and the precipitous drop in military losses due to the services' decreased production of new pilots, there is likely to be a problem. Desired hiring of military pilots by the civilian airlines exceeds the amount the military wants to or can flow to the airlines.

Repercussions could be serious. The pool of military pilots from which civilian airlines hire is the same pool from which the ARC hires (although the ARC also has its own means of training pilots, with some limited number going through UPT). If this pool is becoming drastically reduced, then there is a question as to whether the flows

²⁴Historic production rates for the active Air Force averaged 2,200 from 1971 to 1980, and 1,850 from 1981 to 1990. Current plans are for UPT rates of 500 for FYs 94 and 95 and 800 for FYs 96 and 97. Long-term sustained production rate is anticipated to be 900.

from the active military are sufficient to man the ARC. This may have serious implications for readiness, given the increased dependence on the reserve components, and on our current reserve policy of "compensating leverage."²⁵

²⁵The current strategy is to use the reserve components as a form of "compensating leverage" to reduce risks and contain defense costs in the post-cold war era.

Policies to Mitigate Future Problems

The military has control only over accessions and retention of pilots and policies related to them.

Policy instruments that would affect the flow of military pilots to the airlines include:

- | | |
|-------------------------|---|
| <u>Training</u> | - pilot "production" (UPT) |
| <u>Retention</u> | - incentives to stay in / leave the service |
| | - increase of ADSO |

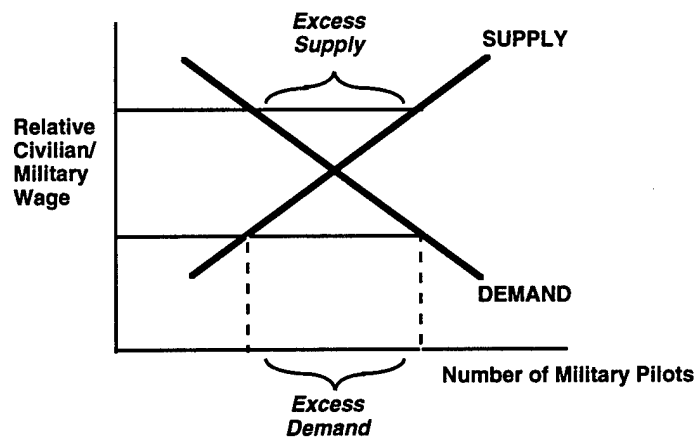
This analysis has suggested that there might be an imbalance between requirements and the available pool of military pilots for hire, and that this might cause some serious repercussions. It is important to examine what management tools are currently available to the military to manage the overall flows effectively. Policies under the military's control are those related to the accessing and retaining of military pilots, although it does not have full control even over these.

The size of the pool of military pilots available for civilian airline hiring (military pilot losses) is directly affected by the two service policy areas of accessions and retention. First, more pilots could be produced by the military through their UPT programs. Needless to say, civilian airline requirements for military pilots are *not* good reasons for the military to train more pilots. However, flows to the ARC also need to be considered.

Second, retention policies would influence how long military pilots stay. They include a wide variety of measures, such as aviation continuation pay and the ADSO.

We discuss these policy instruments and their possible effects on the next charts.

How Pilot Retention Behavior Might Be Influenced by Civilian Airline Hiring



Retention of military pilots is obviously affected by a number of factors, including relative civilian/military wages, promotion opportunities, morale, service policies, etc.

If, at a given relative wage, there is considerable excess demand by civilian airlines, as shown in the graph above, then it is possible that relative wages would rise, leading to a decrease in retention and an increase in the quantity supplied as more pilots leave voluntarily.

On the other hand, if there is excess supply at the current relative wage, then this might further depress the relative wage and lead to a decrease in the quantity supplied as pilots who might have considered leaving voluntarily decide to stay in the military.

Retention Policies

Excess demand for military pilots in the next century may reduce retention of military pilots.

- While this is a problem, it is not *the* problem. Policy instruments to increase retention, such as financial incentives, only marginally increase the number of pilots in the military.

Decreased flow of military pilots to civilian airlines in the future could mean an inadequate supply of pilots to the ARC.

- Active Duty Service Obligation (ADSO) increases would only exacerbate this problem and only marginally deal with the future problem.

In the longer term, retention of military pilots may be reduced, and the flow of military pilots to the ARC could be inadequate. What policy mechanisms could be employed in this situation?

If the numbers of pilots who voluntarily remain in the active force are either insufficient to meet military requirements or are far in excess of the number required, then it is clear that the active force will need to institute policies to manage retention at this point by, for example, changing the use of Aviation Continuation Pay (ACP) bonuses, increasing or decreasing ACP levels, or raising or lowering the ADSO.

An important point to keep in mind, however, is that retention policies often only *marginally* increase the number of pilots in the military. They cannot make up for large shortfalls, or chronic shortfalls in certain categories or major weapons systems. This is because retention policies only influence existing cohorts. If the cohort size is significantly inappropriate to begin with—either too large/small, or too experienced/inexperienced, then the shorter-term retention policy instruments cannot overcome these larger inequities.

Further, policies to "fix" this future retention problem need to consider the total perspective, examining implications for active services, reserve components, and the airlines. One instrument that has been used in the past to ensure greater retention of military pilots is the ADSO. It has been increased over the years from 5 years in the 1970s for both the Air Force and Navy to 8 years.²⁶

Further increase of the Air Force ADSO to 10 years would increase retention of active duty pilots. However, it could have a significant impact on flows to the ARC, which is already facing a future reduced supply of pilots due to reductions in active training. Careful study would be required to ascertain the exact impact of such a change.

²⁶Some weapons systems in the Navy have an ADSO of 7 years.

Accession Policies Are Key to Managing Flow of Military Pilots to Airlines/ARC

- **Flows of military pilots to the ARC and to the airlines will be reduced to unprecedented levels.**
- **Active accessions might need to be increased to ensure adequate flows of pilots to the ARC.**

While short-term retention policies can effect marginal changes on an existing cohort, accession policies are longer-term instruments that address larger, structural issues.

During the drawdown, the U.S. military has dramatically reduced pilot accessions. Part of this reduction is in line with new steady state production requirements. However, this long-term policy instrument is also being used as a short-term instrument, to reduce current inventories. This will result in an inventory "bathtub" for those year groups with reduced accessions.

It is unclear whether these reduced cohorts will supply an adequate flow of pilots to the reserve components. The reduced flow results both from the smaller cohort size and from the likelihood that retention of this smaller cohort by the military will also be greater.²⁷

²⁷Retention seems to be inversely correlated with cohort size in a general sense. Smaller cohorts tend to have higher retention rates than larger cohorts. Promotion possibilities play a role in this.

Summary

U.S. military has interest in providing adequate flow of pilots to civilian U.S. airlines.

- use by air reserve component

Projected flow of military pilots to civilian sector appears more than adequate to meet requirements through the end of the century.

In the longer term, availability of military pilots for civilian airlines drops significantly. Problems could arise if flows are insufficient to support ARC.

- retention policies help only marginally
- increased accessions are likely needed

We have shown in this briefing that the U.S. military has a positive interest in providing an adequate supply of pilots to civilian U.S. airlines. The military benefits from supplying its pilots to civilian airlines in two important ways. First, civilian airline hiring enables pilots to serve in the ARC. Second, airlines provide a potential source of supply of airlift pilots, and equipment and associated support, during a time of conflict. Both of these factors are becoming even more important in the post-cold war era, as demand for U.S. military support in certain areas elevates the need for ARC and civilian airline support.

Through the end of the century, our analysis indicates that there is no problem in meeting civilian airline requirements for military pilots. There is, however, another problem in the short run, when too many pilots may remain in the military. Perception of depressed civilian airline hiring is a factor in this current phenomenon. The services have already had to devise a variety of policy instruments (including paying pilots to separate) to encourage separation of those pilots no longer needed in the post-cold war environment, and more of these instruments may be necessary.

Beyond the year 2002, we find that the reduced production of military pilots will return us to an environment where the airlines would like to hire more military pilots than will be available. This will not be a problem for the airlines, who can turn to a variety of other, albeit less-qualified, sources for their hiring. It could be a problem for the military if an insufficient number of pilots are flowing to the ARC.

While further study of these flows is needed to fully understand this phenomenon, our preliminary findings indicate which policy instruments will be most effective in redressing this shortage. We find that current retention policies can effect change only on the margin. They cannot significantly alter the shape of the force. Accession policies and policies that subsequently experience pilots, on the other hand, are critical to ensure that the force is properly structured, in terms of mission areas and experience. Along these lines, it is likely that current levels of UPT production for the Air Force will need to be increased.²⁸

It is important to point out that the analysis presented here is based upon certain assumptions we have made. Should these underlying assumptions change, it could alter the basic conclusions regarding whether there are problems in the future in flowing active military pilots to the reserves.

²⁸Shortly after this analysis was finished, the Air Force did increase the size of its UPT classes for future years.

APPENDIX: THE U.S. CIVILIAN AIRLINE INDUSTRY

The U.S. airline industry is composed of over 200 certified carriers; however, it is only a small portion of these airlines that hire the bulk of military trained pilots. Terms and concepts that are used throughout this document are defined below.

The U.S. Department of Transportation groups U.S. airlines into four different classes, based on revenues and equipment type.²⁹ *Major* airlines are those with more than \$1 billion in annual revenue. Currently, there are nine passenger and two cargo carriers that fall in this class. They include

- America West
- American
- Continental
- Delta
- Northwest
- Southwest
- TWA
- United
- USAir
- Federal Express
- United Parcel Service (UPS).

²⁹A fifth class has been recently added at the top, further differentiating the major airlines into *global* airlines—those with \$5 billion or more in total annual revenue and \$1 billion or more in international revenue, and *major* airlines—those airlines with \$1 billion or more in total annual revenue. Since this is a recent change, and most data used for this study did not use the new *global* class, this study excluded this class from the analysis.

The second class of airlines, *national* airlines, have annual revenues of between \$100 million and \$1 billion. These airlines vary greatly, and include local and regional airlines, as well as national cargo carriers such as Airborne Express. There are roughly 20 airlines that fall into this class, although the exact number is constantly changing.

Turbojet airlines are defined as those airlines with less than \$100 million in annual revenue that fly jet equipment. They include cargo airlines, regional feeders, as well as other passenger carriers.

Finally, there are *regional* airlines, a term used in a variety of ways throughout the industry, but which is defined as an airline that flies turboprop or other propeller-driven aircraft.